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ON THE LAND SHELLS OF BOURBON, WITH DESCRIPTIONS OF A FEW NEW SPECIES,—by GEOFFREY NEVILL, C. M. Z. S.

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The described land shells of Bourbon, or La Réunion, are far fewer in number than those of its sister Island. This can be accounted for, by the great difficulties the collector has to encounter in the mountainous districts, -always the most prolific, owing to the great height of the mountains, which are at the same time extremely rugged and precipitous; -secondly, by the greater part of the Island which is under cultivation being almost devoid of the deep, well-wooded ravines and small hills, rising abruptly from the table-land, which form such a characteristic feature of the present Mauritian scenery and still enable the naturalist, throughout that Island, to examine at his ease, at least some trace of the original fauna and flora. I have not the least doubt that in the centre of Bourbon, scarcely ever visited by any naturalist, on the slopes and plateaux of the almost unexplored lofty mountains,in whose most inaccessible parts, descendants of the old Maroons are still said to exist in a perfectly wild and savage state,many very interesting new species and even perhaps genera are yet to be found. I much regret not having had time to explore Cilaos, Plaine des Palmistes and the district round the still active volcano, all three evidently offering a rich field to the naturalist; unfortunately my time was limited in the walking tour which I made round the Island. I now give a list, with a few remarks attached, of all the species which, as far as I am aware, have as yet been described from Bourbon.

1. Helix celatura, Fér., Prod. 48. (Nanina apud Albers.) This is, as far as I can remember, a true Helix and not a Nanina; unfortunately I did not make any note on this point, when I examined the animal, though I probably should have done so, had it possessed a mucous gland.

The tentacles are purplish-black, the front of the neck stained dark brown, the posterior part of the animal yellowish-brown, sole

of the foot the same. It is tolerably abundant in damp places under stones &c., in ravines, at an elevation of about 1000 feet above the sea. I found it alive in nearly all stages of growth; in the very young state it somewhat resembles the figure of Vitrina Borbonica, Morlt., Series Conchil. p. 48, 1860.

2. Helix (Dorcasia) similaris, Fér., Prod. 262 (var. Borbonica, Desh., Moll. de la Réun. p. 85).

This shell is very common everywhere throughout the Island; there are two common varieties:—var. A, very large, much more so than any I found at Mauritius or the Seychelles; var. B, smaller, with a broad brown band, much more developed than in any from the other localities of this widely distributed *Helix*. Deshayes makes a species, *H. Borbonica*, which is nothing but this variety, only the above characteristics are even more marked than usual. Animal light brown, closely mottled with minute, pale yellowish spots, tentacles brown.

- 3. Helix? Detecta, Fér., (Nanina apud Albers). This and the following 2 species I did not find myself.
- 4. Helix? Frappieri, Desh., Moll. de la Réun. p. 86.
- 5. Helix Eudeli, Desh., ibid. p. 87 (?-Barclayi, Bens.).
- 6. Helix imperfecta, Desh., ibid. p. 89.

At about 2000 feet elevation, rare and local, in damp woods; this species is also found at Mauritius, where it is far more abundant, creeping about on the ground amongst decaying vegetation; my specimens from both Islands cannot be distinguished from one another.

7. Helix setiliris, Bens., Ann. Mag. 1851, p. 252. (H. Vinsoni, Desh.).

Another species common to both Islands, found in the same localities as the preceding; it appears to be rare at both.

8. HELIX BARCLAYI, Bens. (Erepta apud Albers).

This is, I believe, Deshayes' H. Eudeli, both description and figure agree admirably; the unique specimen, from which this latter was described, appears to have been accidentally broken, whilst being figured. Deshayes says, "from the debris I believe it to have been 6 to 7 mil. in diameter"; of H. Barclayi, however, I have never found any specimen more than 4 mil. At Bourbon I found this species rather local, on huge boulders, perfectly undistinguishable from Mauritian specimens.

Tentacles iron grey, posterior of foot white, the rest of the animal the same, with numerous and regular dark grey streaks, showing very distinctly through the transparent shell in a transverse pattern.

9. HELIX SALAZIENSIS, n. sp.

Shell very minute, somewhat turbinated, horny, thin and fragile; 4½ rather convex whorls, minutely transversely striated, striæ wide apart, acute and presenting, under a magnifying glass, a somewhat lamellar appearance; widely and deeply umbilicated; the base rather convex, in young specimens provided with a similar sculpture as on the whorls, becoming obsolete, however, in full grown ones; aperture small, with the margin of the outer lip simple and acute.

Diam. 2, Alt. 4-5 m.m.

I have named this minute species after the village near where I found it, about 24 miles up a steep pass towards the centre of the Island. Salazie is extensively used as a sanatarium, on account of the invigorating temperature and some noted mineral water-springs; it seemed to me, to be one of the most favourable localities I have yet visited in the tropics for the botanist and naturalist: plants and ferns, insects, birds, &c., all seemed equally attractive and abundant. I especially noticed many beautiful Orchids in my rambles towards the old extinct volcano, which towers, some little distance off, at the back of the village, some 11,000 feet above the sea. I found the little shell above described, in company with the preceding, on large masses of rock.

10. Nanina (Macrochlamys) Geoffreyi, H. Ad. Proc. Zool. Soc., 1868, p. 289.

In the original description, there is unfortunately an error in the printing of a note from myself; it should be "the animal is yellow and black and resembles that of N. nitella, that of N. virginea is of a uniform dark grey, almost black."

Animal provided with a mucous gland, tail truncated; tentacles black, the black continued a short distance beyond their bases; neck yellowish-grey, slightly mottled with black, the hinder part of the animal yellow, mottled on the sides with black, bordered with a yellow margin; sole of foot yellow. It closely resembles the animal of *H. nitella*, as described by myself, Zool. Soc. Proc. 1868, p. 258, the shell, however, is very different, being not nearly so depressed, &c.; it is more like *H. proletaria*, Morlt., but the last whorl is not carinated, &c. It is abundant at Salazie under dead leaves, stones, &c., in damp woods.

11. NANINA (MACROCHLAMYS) MAILLARDI, Desh., Moll. de la Réun. p. 86.

I procured two or three specimens of a shell, which I have identified with this species, both at Mauritius and Bourbon; unfortunately I did not succeed in finding live specimens, or a sufficiently large set of the shells, to be perfectly certain of their identity.

12. Nanina Linophora, Morlt., Ser. Conch. p. 57 (? argentea var.)

I did not succeed in finding this species myself; I consider it as the most aberrant form of a small group of Mascarene shells, probably all descended from a common stock at some not very remote period, now constituting more or less "good species," according to the individual opinion that each naturalist may have formed for himself, as to what should constitute a species and what a variety. I would class these species as follows:—

A. Nanina linophora. This is the most narrowly turbinated, exerted form of the group, with the strong keel visible on all the whorls, it is described as coarsely striated; it is apparently very scarce.

- B. Nanina argentea, Rv., Conc. Icon. No. 1434. I should fancy this must be the oldest, or nearest to the original type, from almost perfectly similar forms being found in both the sister Islands, under circumstances that would seem to preclude the possibility of its having been introduced into either. In form it is very close to the preceding, but the last whorl is more dilated, not compressed, the sharp keel not visible on the other whorls; it is finely striated.
- C. Nanina implicata, n. sp. Closely allied to N. semicerina Morlt; it differs by the whorls being rounder, more convex, the keel in consequence almost rudimentary; the green band of the epidermis round the umbilious is a little broader, without the conspicuous brown stripe next the suture, in its place the same green epidermis, as round the base, forms two bands in the centre of each whorl, the lower one being broad and distinctly marked throughout, the upper one indistinct and interrupted, only clearly developed in the last whorl; the apex is more obtuse, but the most characteristic distinction is the absence of the coarse, regular striation, N. implicata being perfectly smooth; the proportions of the two species are almost exactly the same.

In the style of colouring, it somewhat resembles *N. argentea*, it can, however, be easily distinguished by its more depressed and concave whorls, on the last of which, there is an almost imperceptible keel.

'Rare; Peter Botte Mn. Mauritius.

D. Nanina semicerina, Morlt., Rev. Zool. 1851, p. 219, (Rawsonis, Bens.). Locally abundant at Mauritius on shrubs, &c., in very damp woods. This handsome shell varies considerably in colouring, the whorls are a little less concave than in the last, the keel on the last whorl a little more developed; it is the most strongly striated species of the group.

Animal whitish, neck mottled with black, tentacles grey.

13. Nanina argentea, Rv.

I have already spoken of the affinities of the shell of this species; the animal is of a pure white, the front of the neck having a faint yellow tinge, the tentacles are orange with dark grey streaks; the tail is sharply truncated, near it there is a mucous pore with a

prominent, pointed, orange-coloured hook close to it. Found with *Helix cælatura*, tolerably abundant, but local, at a considerable elevation, in damp places.

14. Nanina (Macrochlamys) nitella, Morlt., Rev. Zool. p. 219.

This Mauritian species is recorded by Deshayes, Moll. de la Réun. p. 85, as also found in Bourbon, I did not find it, however, at the latter Island. I have described the animal from Mauritian specimens, Proc. Zool. Soc. 1868, p. 258.

15. Nanina? proletaria, Morlt., Ser. Conch. p. 60.

Another Mauritian shell, mentioned by Deshayes as found with the preceding, I think it just possible, he may have mis-identified his Bourbon specimens, and that they may prove to belong to the species subsequently described by H. Adams as N. Geoffreyi. I certainly found no shell of this type, with the last whorl angulated, or carinated, at the periphery, agreeing with Morelet's description of N. proletaria.

16. NANINA PRÆTUMIDA, Fér. Bull. un. des sc. p. 303.

Animal white, thickly sprinkled with dark grey, especially on the neck, tentacles iron-grey; provided with a mucous pore. Very local, but not rare, found at a considerable elevation in damp woods amongst decaying vegetation &e; living under the same bushes; distinguishable only by the proportions and number of the whorls and by the total absence of the strong canaliculation of the sutures; I found a good many specimens of a shell which I will now describe.

17. NANINA CORDEMOYI, n. s.

Shell almost exactly like the preceding, only a shade smaller; with only five whorls, not compressed, with the suture not canaliculated, somewhat indistinctly banded with a rather broad brown belt; slightly more openly perforated.

N. prætumida, height 61, diam. 9 m. m.;

N. Cordemoyi, ditto 6, ditto, 81 m. m.

I have named this shell after M. Jacob de Cordemoy, a well known botanist at Bourbon.

18. Stenogyra (Opeas) clavulinus, Pot. and Mich. Gall. de Douai, I, p. 136.

This little Bourbon Opeas is easily distinguished at a glance from the still more common and widely spread group, (O. gracilis, Hutt., O. Mauritiana, Pfr. &c.,) by its more polished and shining appearance, by its being devoid of regular and distinct striation, by its more swollen and more rapidly increasing whorls, this difference being especially noticeable in the first few whorls near the apex, by its more angular aperture, &c.; it is, I believe, the shell described by Pfr. Mon. Hel. Vol. I. p. 159, in the foot note marked with a single asterisk, where it is referred to the Bul. clavulinus of P. and M., he there gives the length of the species as 8 mill., this is probably my var. A.; in Vol. III. he re-describes the species from a Mauritian specimen, where he gives the length as only 6 mil. &c., agreeing with my var. B. I have never seen this species from Ceylon or any part of India, though the other group of O. gracilis &c., is as abundant at both, as at Mauritius and the Seychelles; I did not, however, find my var. B. of O. clavulinus at Bourbon, though I expect both it and Opeas Mauritiana and gracilis will eventually be discovered there; the habits of the subgenus Opeas are more favourable, than perhaps those of any other mollusk, to their introduction into distant countries, they are to be found in cultivated spots nearly everywhere, even in the gardens of large cities like Calcutta and Port Louis, where they bury themselves in the ground amongst the roots of plants, &c., sometimes under stones.

I divide this species (O. clavulinus, P. and M.) into two forms or varieties—

A. Whorls seven, the last one especially not quite so tumid as in the next variety. Bourbon, Mauritius and the Seychelles.

Long. $8\frac{1}{2}$, diam. maj. 3; long. apert. $2\frac{3}{4}$, diam. $1\frac{1}{2}$ m. m.

B. (Pfr. Mon. Hel. III. p. 394). Whorls six, broader in proportion to their length than those of the preceding. Mauritius and the Seychelles.

Long. 6, diam. $2\frac{2}{3}$; long. apert. $2\frac{1}{4}$, diam. $1\frac{1}{4}$ m. m.

My numerous specimens of this variety all have the above measurements, agreeing with those given by Pfr. loc. cit., except as regards the aperture, to which he ascribes $2\frac{3}{4}$ in length and 1 in breadth. I purpose speaking of the other Mauritian species of this sub-genus in another paper, which I hope to publish shortly, on the land shells of Mauritius.

19. Bulimus venustus, Morlt. Journ. de Conch. 1861.

I found no species of this genus, and think it possible Maillard may have, by accident, sent some shell from the Comoro Is. to Deshayes, who has recorded this species from Bourbon.

20. Ennea bicolor, Hutt., J. A. S. Beng.; III, p. 93.

I believe myself that this little species has been introduced here amongst the roots of shrubs, &c., as well as into Mauritius, the Seychelles &c.; I have always found it in all these islands near the sea, in other words where there has been a great deal of cultivation.

21. GIBBUS (GIBBULINA) INTERSECTA, Desh., Moll. de la Réun. p. 91, (? var. of *Bourguignati*, Desh.).

I think this species is very doubtfully distinct from the following, of which I found some undoubted varieties approaching, by a slight diminution in the convexity of the whorls, very closely to Deshayes' figure of the present species.

22. Gibbus (Gibbulina) Bourguignati, Desh., ibid p. 90. (bacillus, Pfr. var.).

I have hesitated some little time, whether to accept this species or not, it only differs from the Mauritian G. bacillus, Pfr., by its slightly smaller proportions and by a very marked difference in the sculpture, which in this species is very fine, hardly discernible except under the lens, whereas it is coarse and very distinct in G. bacillus, this characteristic has decided me on retaining the species; the animals are hardly distinguishable. I should have described the colour of the animal of G. bacillus as yellowish inclined to green" in my description in Zool. Soc. Proc. 1868, p. 259, that of the present species is a decided yellow,

with the front of the neck slightly crimson, sides of the foot mottled with dark brown, tentacles crimson. Not uncommon, widely spread, in damp woods. My specimens are all rather smaller than Deshayes' type, being $9\frac{1}{2}$ mill. in length and $5\frac{1}{4}$ in diameter; a variety, probably Deshayes' intersecta, being in length 10 and in diameter 43. This shell agrees very fairly with a species figured as P. versipolis, Fér. in Deshayes' Hist. des Moll. and in Küster's Conch. Cab. Pl. XI, f. 11 and 12, though I believe them to represent Mauritian specimens of the allied G. bacillus, Pfr., despite the magnified sculpture in both agreeing far better with that of the present species. Morelet, Ser. Conch. p. 89, justly points out that the figured specimens do not agree with the original description; Férussac's remark that the animal of G. versipolis is of a rich orange red fortunately sets the question at rest, confirming Morelet; it can neither be G. bacillus nor G. Bourguignati, the animals of both of which are pale yellowish.

23. GIBBUS (GIBBULINA) VERSIPOLIS, Fér., (=funiculus, Val.)

Of this species I only succeeded in finding one or two live specimens in a damp wood under stones; dead, bleached shells, on the other hand, were more plentiful and wider spread than those of any other Bourbon species of the genus, especially on the dry, sandy plateaux behind Salazie, where I could find no traces of any other land shells whatever; the animal is of a rich dark orange colour with purplish-black tentacles and with 2 broad streaks of the same shade on each side of the foot. This is, I have no doubt, the shell Férussac called Pupa versipolis, Prodr. 468. The figure given by Morelet, Ser. Conch. Pl. V, fig. 14, (the lower variety principally) corresponds perfectly with some of the varieties I found of the present species at Bourbon, though not exactly with any of the Mauritian species that I have seen, the nearest being G. holostoma, Morlt., var. and G. Dupontiana, mihi, one of which has probably given rise to the statement that G. versipolis, F é r., is also from Mauritius. Morelet states the specimen figured to be an authentic specimen of Férussac's type, but does not clearly mention whether it is from Bourbon or Mauritius; in any case it differs materially from both G. bacillus and G. Bourguignati, one of which, as I before mentioned, was figured by Deshayes and Küster for this shell. Férussac's note that the animal is a handsome scarletorange colour answers perfectly to this species, the only shell of this type from Mauritius with a similar animal is G. holostoma, Morlt., one of these two then G. funiculus, or G. holostoma, must be Férussac's original versipolis, and if the type specimen was from Bourbon, it undoubtedly belonged to the present species, the colour of the animal precludes its having been either G. bacillus, Pfr., striatacosta, Morlt., or the shell kindly identified for me as it by Mr. H. Adams from the late Mr. Cuming's collection, the animal of which I wrongly described under this name in Proc. Zool. Soc. 1868, p. 260, and which is, I believe, a new species; these three last have as yet been found in Mauritius only.

24. GIBBUS (GIBBULINA) TURGIDULUS, Desh., Moll. de la Réun. p. 93.

This shell appears to be very rare, I did not succeed in taking it alive, I procured my specimens on the road to Salazie; it most resembles a small variety of the Mauritian G. callifer, Morlt.

- 25. Gibbus (Gibbulina) uvula, Desh., ibid. Also rare, with the preceding.
- 26. GIBBUS (GIBBULINA) CYLINDRELLA, H. Ad., Zool. Soc. Proc. 1868.

Very scarce, in damp woods at a considerable elevation.

27. GIBBUS (GIBBULINA) DESHAYESI, H. Ad., ibid.

I only found a few specimens of this interesting little species amongst loose stones, on a very arid mountain close to the village of Salazie.

28. Vertigo (?) pupula, Desh., Moll. de la Réun. p. 92.

Abundant on large boulders, overgrown with creepers &c., near Salazie, I examined it carefully and could only detect a single pair of tentacles, unfortunately I had no magnifying glass with me at the time to make quite certain.

Vertigo (ALÆA) Borbonica, H. Ad., Zool. Soc. Proc. 1868,
290.

Very local, also found on huge masses of stone, at a great elevation.

30. VERTIGO (PAGODELLA) INCERTA, n. sp.

Shell very closely resembling Vertigo (Pagodella) ventricosa, H. Ad., from Mauritius; there are, however, two parietal teeth and within the outer lip a distinct, well-developed tooth, with occasionally another small, indistinct one close to it; the columellar is slightly more dilated and sub-angulated; rare, in company with V. pupula near Salazie.

This most perplexing of shells can only be distinguished from Pagodella ventricosa, H. Ad., Proc. Zool. Soc. 1867, p. 303,—by the different dentition of the aperture; of the latter I found about 40 specimens, to all appearance full grown and in first rate condition, some of them, to my mind, very old specimens, in none of them were there any signs of any teeth whatever within the outer margin of the aperture! Of the Bourbon species, I only found 5 specimens, one evidently young, the other 4 full grown and all showing the peculiar characteristics pointed out in my description. Still the resemblance is so striking, that I think no naturalist would hesitate to avow, that they must at no very remote period have had a common origin; there is, indeed, just the chance that at Mauritius a similar variety may exist, but, from the number of specimens I found there, I doubt it exceedingly. I have, however, written to Mr. Dupont at Mauritius to ask him to kindly examine all he can possibly procure of this species, and to see if he can find any trace of the apertural teeth, which give such a different appearance to my V. incerta.

31. Tornatellina (Septinaria) cernica, Bens.,, Ann. Mag. 1851, p. 255.

This interesting shell is perfectly identical with the Mauritian form, described by Benson, I found it, at a considerable height, with Vertigo Borbonica.

32. Succinea mascarensis, n. sp.

This shell is also common at Mauritius, where it lives in the cultivated plains on walls &c., Deshayes records it, Moll. de la Réun. p. 90, as S. striata? Krauss, which it certainly closely resembles, but can be distinguished by its less ventricose and more attenuated form. It also resembles Quoy's Succinea australis from Tasmania.

Shell resembling S. striata, Krauss, but smaller, with the last whorl and the aperture more compressly elongated; the apex also is more tumid, not so produced.

Length 7, diam. 4½, m.m.

33. Achatina fulica, Fér. Prod. p. 347.

Deshayes also mentions as found in Bourbon, A. fulva, Fér., this was probably one of the numerous varieties of this Protean species.

34. A. Panthera, Fér. Prod. p. 349.

Deshayes records this species from Bourbon, where I suppose it was introduced as at Mauritius, I did not find it myself. I take the shell, mentioned on the same page as A. purpurea, to have been probably a variety of this species.

35. Hyalimax maillardi, Fisher, Journ. de Conch. Vol. XV.

Animal flesh colour, mantle brown, posterior of foot pointed, produced, thickly marked with longitudinal dark brown lines; 4 dark brown tentacles. The colour often varies in being of a lighter shade throughout. Abundant near Salazie, in damp woods under stones, leaves &c.

36. Cyclostoma (Tropidophora) tricarinatum, Lam.

I only found this curious species at Mauritius, where it is very rare and sub-fossil, as extinct there, I believe, as the Dodo.

37. CYCLOSTOMA FIMBRIATUM, Lam.

This, like the preceding, I did not find myself at Bourbon, they are both recorded by Deshayes.

38. Omphalotropis rubens, Q u o y, Voy. de l'Astrol. p. 189, (var. *Moreleti*, D e s h. Moll. de la Réun. p. 81).

Of this species I found two varieties, one the typical, often undistinguishable from the Mauritian form; the other a slightly smaller variety, named by Deshayes, O. Moreleti, Moll. de la Réun. p. 84; it is a little smaller, more attenuated, the whorls are slightly less ventricose, and the sculpture, though the same, a shade more obsolete, the broad brown bands round the whorls are very striking and are nearly always more or less present, the Bourbon typical form also often possesses them, though not so generally; at Mauritius, on the contrary, the striped variety, is very rare indeed, in this respect presenting a remarkable analogy to Helix similaris, of which Deshayes has also made a species from an extreme form, as I have previously mentioned, which may well be compared with his Omphalotropis Moreleti in their relationship to their respective type forms.

39. OMPHALOTROPIS BORBONICA, H. Ad., Proc. Zool. Soc. 1868, p. 289.

This very distinct species cannot be confounded with any other of the genus, it can instantly be distinguished from O. rubens, with which it agrees in size, by its being very minutely and indistinetly spirally punctated, instead of finely, distinctly, longitudinally striated, the whorls are much more convex, the last one more ventricose, the outer margin of the aperture not reflexed, the colouring more constant and more sombre, the umbilicus wider, the keel scarcely raised, obtuse, and broad, instead of narrow, acute and thread-like. In the plate accompanying Mr. Adams' description, the colouring does not give a quite correct idea, the ground colour is a darkish brown, sometimes indeed without any markings at all, but generally minutely and rather closely maculated with dull yellow, in rather a zigzag manner, the broad keel also, where it shows through in the interior of the aperture, as it does in fresh specimens, should be of a light yellow and not dark brown. I think too in the description, it should not be "et circa perforationem compresse carinato," as it is decidedly less compressly carinated round the umbilicus than its near ally, the type of the genus, O. rubens. In damp woods, tolerably abundant.

40. Omphalotropis expansilabre, Pfr.

This is another Mauritian species, my specimens from the two islands being perfectly undistinguishable after a most careful examination. Rare, at a considerable elevation, crawling on the ground in damp woods.

41. OMPHALOTROPIS PICTURATA, H. Ad., Proc. Zool. Soc. 1869, p. 305.

Another of my new species from Mauritius, where it is extremely rare. I subsequently succeeded at Bourbon, with much trouble, in getting a better set of specimens, but it appears to be there also exceedingly local; it is distinguished at a glance by its more attenuated and produced form, and by its last whorl being ventricose, perfectly rounded at the periphery, not in the least angulated or keeled. A very faint keel round the umbilicus is discernible in all of my Bourbon specimens.

I have purposely not mentioned a species described by Morelet, Ser. Conch. p. 48, as Vitrina Borbonica, I cannot help having great doubts of the correctness of the recorded locality; Deshayes does not include it in his Cat. des Moll. de la Réunion. I know of no species of the genus from the Mascarene Islands.